Agilent P3214 pH Combined Electrode

pH 复合电极

Operating Guide

用户手册

Agilent Technologies

Overview

The P3214 pH Combined Electrode can measure the pH of semi-solid substances. It is used with the 3200P pH meter or similar meters.

WARNING **Use this electrode according to the operating manual to avoid personal injury.**

WARNING **The electrode solution can cause chemical burns or illness if it is taken orally or contacted by human skin. Use protective clothing or gloves to avoid contact. In case of contact, rinse contacted area with tap water or deionized water thoroughly.**

CAUTION The electrode body material is glass. Handle with care to avoid damage to the instrument.

Specifications

Table 1 P3214 pH Combined Electrode specifications

Specification	Value
pH range	0 to 14
Zero potential pH	7.00 ± 0.5
Temperature range	0 to 60 °C
Internal impedance	< 500 MΩ
Reference type	Ag/AgCl
Reference filling solution	3 mol/L KCl containing AgCl
Liquid junction material	Fiber
Body material	ABS
Measuring terminal probe diameter	14 mm (including stainless steel sheath)
Measuring terminal probe length	55 mm
Cable interface	BNC
Cable length	1000 mm

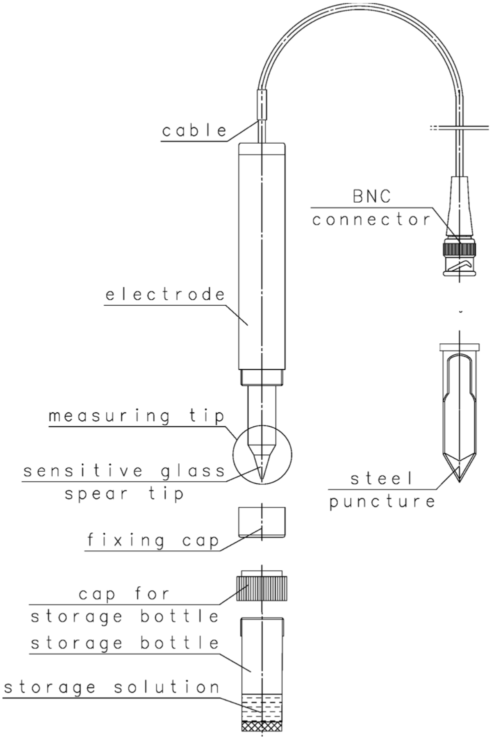

Figure 1 P3214 Combined Electrode assembly

Operation

Preparing the electrode

1. Remove the electrode from the storage bottle. Store the bottle with its mouth facing upward for future use.
2. Rinse the measuring tip with distilled water or deionized water. Hold the measuring tip downwards and swing the electrode several times.
3. Unscrew the fixed ring, install the protective stainless puncture on the electrode body, and attach the fixed ring until finger tight.

Calibration

1. Connect the electrode to the meter. Input the temperature value of calibration solution according to procedures listed in the meter operating manual.
2. Soak the measuring tip in calibration solutions in sequence. Calibrate the electrode according to the procedures listed in the meter operating manual.

Measurement

After calibration, slowly insert the measuring tip into the sample. When the reading becomes stable, record the value from the meter.

Operating hints

- The main materials of the measuring tip are stainless steel and ABS plastic. Ensure the sample solution will not damage the measuring tip before measurement.
- Do not test samples with hard, large, or fixed solid particles. This may damage the sensitive glass spear-tip from the side.
- Do not leave the electrode in the sample for a long time. After measurement, rinse the electrode carefully.

- The pH value of a solution is affected by its temperature. Maintain the temperature of the solution at ambient to ensure accuracy of measurement.
- During electrode calibration, use solutions of pH 4 and pH 7 for acidic samples and solutions at pH 7.0 and pH 10.01 for alkaline samples.
- White powder or crystals that collect on the electrode during measurement or transportation do not affect the performance of the electrode. Rinse the residue with tap or deionized water.
- Do not apply force onto the electrode cap, cable, or cable interface.
- Keep the cable interface dry.

Maintenance

Cleaning of inorganics

Soak the measuring tip in 0.1 mol/L HCL or EDTA solution for 15 minutes.

Cleaning of organics

Soak the measuring tip in absolute ethyl alcohol, or other solvent that can dissolve organics for 15 minutes.

Cleaning of grease

Soak the measuring tip in warm weakly alkaline detergent for 15 minutes.

Cleaning of protein precipitation

Soak the measuring tip in 0.1 mol/L HCL solution that contains 1% pepsin for 15 minutes.

Regeneration of sensitive glass membrane

WARNING **HF is lethal. Refer to the HF material safety data sheet before using it.**

1 Soak the sensitive glass membrane in 4% HF solution for 3–5 seconds.
2 Rinse with 0.1 mol/L HCL several times.
3 Rinse with distilled water or deionized water.
4 After cleaning the electrode, exchange the reference filling solution and soak the measuring tip in reference filling solution for 2 hours.

Troubleshooting

Meters

Refer to the meter operating manual. Check all related parts, such as the electrode, calibration solution, and samples.

Electrode

1 Connect the electrode to the meter. Set the meter to display mV.
2 Soak the measuring tip in calibration solutions of pH 4.00 and pH 10.01. When the readings become stable, record mV value respectively.
3 If the absolute value of the difference between these two mV readings is 326–370 mV in total, it indicates the electrode has a good performance. If not, perform maintenance on the electrode.

Calibration Solution

- Use the correct calibration solution.
- The distilled water or DI water used to prepare calibration solution should meet with corresponding requirements.
- The calibration solution should not be contaminated, degraded, or expired.

Accuracy

1 Choose any two calibration solutions to calibrate the electrode.
2 Use the calibrated electrode to measure the pH value in another calibration solution.
3 Compare the theoretical value of that calibration solution with the measured value.
4 Check if the measuring accuracy of the electrode satisfies the user’s need.

For any other problems during electrode use, contact your Agilent Technologies customer service representative.

Storage

1 Unscrew the fixed ring.
2 Remove the stainless protective puncture.
3 Brush the measuring tip gently with a fine brush.
4 Rinse the fixed ring and protective stainless puncture.
5 Install the storage bottle cap and storage bottle onto electrode body in sequence. To protect the measuring tip, keep 5–10 mm between the bottom of the storage bottle and the electrode measuring tip when installing the electrode. Screw the electrode storage bottle cap onto the storage bottle until finger tight.
6 Place the electrode in its storage box and store it at ambient temperature and dry conditions.

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概述

适用于半固体物质 pH 值测量，是可充式 pH 锥形复合电极，与 3200P 仪器或类似仪器配套使用。

安全提示

1 按使用说明使用电极。

2 电极附带的填充液不宜口服或接触人体敏感器官，如意外接触，应立即用自来水或去离子水清洗。

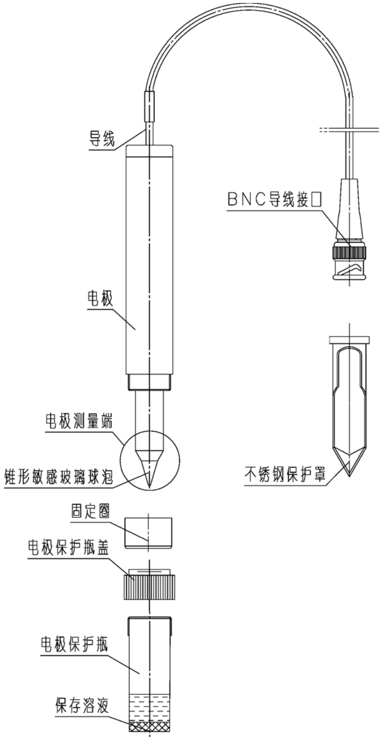
3 本电极附带的不锈钢保护罩比较锐利，使用时应注意。在没有成年人监管时，不要让十八岁以下人接触或使用。

4 在储运或使用过程中，电极上可能有少量白色粉末或晶体附着，这是由部分渗出的参比填充液或保存溶液失去水分引起，可用自来水或去离子水冲洗去除，不影响电极的性能。

技术参数

测量范围	0–14 pH
零电位	7±0.5 pH
适用温度范围	0-60 ℃
电极内阻	< 500 MΩ
参比系统	Ag/AgCl
外壳材质	ABS
液接界材料	纤维
参比填充液	含 AgCl， 3 mol/L KCl
电缆接口	BNC
测量端直径	14 mm （含不锈钢保护罩）
测量端长度	55 mm
电缆长度	1000 mm

电极插图



使用步骤

电极准备

1 旋开电极保护瓶盖，依次取下电极保护瓶、电极保护瓶盖，将电极保护瓶开口向上水平放置待用。

2 用蒸馏水或去离子水冲洗电极测量端，将电极测量端向下，空甩电极数次。

3 旋下固定圈，将不锈钢保护罩安装在电极外壳上，然后缓慢旋紧固定圈。

电极测量

1 将电极与仪器连接，按仪器说明输入校正溶液的温度值。

2 将电极测量端依次浸没于校正溶液中，按照仪器说明校正电极。

3 校正完毕，将电极测量端缓慢刺入被测物体内部，待读数稳定后，读取读数。

4 测量完毕，旋下固定圈，取下不锈钢保护罩，用细毛刷轻轻刷洗电极测量端，同时冲洗固定圈和不锈钢保护罩，然后依次将电极保护瓶盖、电极保护瓶安装在电极外壳上，安装时电极与电极保护瓶的底部保持 5–10 mm 距离以免造成电极损坏 , 并旋紧电极保护瓶盖。

储存方法

电极放回电极包装盒内，室温干燥保存。

注意事项

- 电极测量端的主要材料为不锈钢和 ABS 塑料，测量前应确认被测溶液不会对电极测量端造成损伤。
- 被测物体内部不得含有较硬、较大且不能移动的固体颗粒，否则有可能会从侧面损伤锥形敏感玻璃球泡。
- 请勿将电极长时间滞留于被测物体内，电极使用完毕，请仔细对电极进行清洗。

- 溶液的 pH 值受温度影响。例如，被测溶液的温度为 10 ℃，此时仪器显示的 pH 值是该溶液 10 ℃时的 pH 值。如需得到 25 ℃下样品 pH 值，则需把样品温度升至 25 ℃后进行测量，仪器的温度补偿功能不能将溶液 10 ℃时测量的 pH 值转换为 25 ℃时的 pH 值。
- 校正电极时，若被测溶液的 pH 值为酸性，建议使用 pH 4.00 和 pH 7.00 校正溶液；若被测溶液的 pH 值为碱性，建议使用 pH 7.00 和 pH 10.01 校正溶液。
- 电极帽、导线以及导线接口部分应避免受力，以免损坏。
- 导线接口必须保持干燥。

电极维护

电极清洗和修复

1. 无机物清洗：
   将电极测量端浸于 0.1 mol/L HCl 或 EDTA 溶液中 15 min。
2. 有机物清洗：
   将电极测量端浸于无水乙醇 （或能够溶解该有机物的溶剂）中 15 min。
3. 油脂类清洗：
   将电极测量端浸于温热的弱碱性洗涤剂中 15 min。
4. 蛋白质沉淀的清洗：
   将电极测量端浸于含 1% 胃蛋白酶的 0.1mol/L 盐酸溶液中 15 min。
5. 玻璃敏感膜修复 （注意：HF 是有毒物质，使用前阅读该物质使用说明）：
   将电极测量端浸于 4% HF 溶液中 3–5 s，然后用 0.1 mol/L HCl 漂洗数次，用蒸馏水或去离子水清洗。

疑难解答

电极使用中发现异常情况，请按下列步骤查找原因

仪器

参看仪器说明书的相关部分

查看仪器、电极、校正溶液、样品等相关部分之间的衔接。

电极

1 确认电极性能良好

   a 将电极与仪器连接，仪器显示调整为 mV 读数。

   b 将电极测量端依次浸于 pH 4.00 和 pH 10.01 校正溶液中，待仪器读数稳定后分别记录 mV 值。

   c 两次记录的 mV 差值绝对值应在 326–370 mV 之间，则电极性能良好，否则对电极进行维护。

2 检查电极测量准确度

   a 用任意两种校正溶液对电极进行校正。

   b 用电极测量其他校正溶液的 pH 值，将测量值与被测校正溶液的理论值进行比对，查看电极测量准确度是否满足用户需求。

校正溶液

1 校正溶液来源有效。

2 配制校正溶液用的蒸馏水或去离子水应符合要求。

3 校正溶液应在有效期内，不污染或变质。

如在电极使用过程中有其他疑问，请联系售后服务部门。

如需购买，请与安捷伦经销商联系或者登陆安捷伦官方网站。

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Printed in China 03/2012
First edition, March 2012

5973-1793

Agilent Technologies